

What Architects Need to Know About:

Variable Refrigerant Flow (VRF) Systems

Overview

Variable refrigerant flow (VRF) is an air-conditioning system configuration where there is one outdoor condensing unit and multiple indoor units. The term “variable refrigerant flow” refers to the ability of the system to control the amount of refrigerant flowing to the multiple evaporators (indoor units), enabling the use of many evaporators of differing capacities and configurations connected to a single condensing unit. The arrangement provides an individualized comfort control, and simultaneous heating and cooling in different zones.

These simple systems are designed mainly for small to medium commercial applications. The small-bore refrigerant piping, which connects the indoor and outdoor units requires much lower space and is easier to install than the metal ducting. Each indoor unit has its own set of refrigerant pipe work connecting it to the outdoor unit.



VRF System with One Condenser Serving Multiple Room Units

Energy Efficiency

Variable refrigerant flow systems with heat recovery (VRF-HR) capability can operate simultaneously in heating and/or cooling mode, enabling heat to be used rather than rejected as it would be in traditional heat pump systems. VRF-HR systems are equipped with enhanced features like inverter drives, pulse modulating electronic expansion valves and distributed controls that allow system to operate in net heating or net cooling mode, as demanded by the space. The combinations of these benefits can make these system some of the most energy efficient systems available for small to medium size commercial and educational facilities. Some of these systems have Energy Efficiency Ratios (EER's) up in the high twenties range – numbers that were unheard of in the industry just a year or two ago

SEER's
over 25!

Aesthetics

Indoor units are available in a variety of configurations including floor mounted, wall mounted, T-bar ceiling mounted and above ceiling fan coils. These units can be provided in any combination, all connected to a single outdoor condensing unit. This versatility lends allows the units to be selected to suit the architectural concerns of each space in the building.

Variations of VRF Fan Coil Unit.

Courtesy of Mitsubishi Corp.



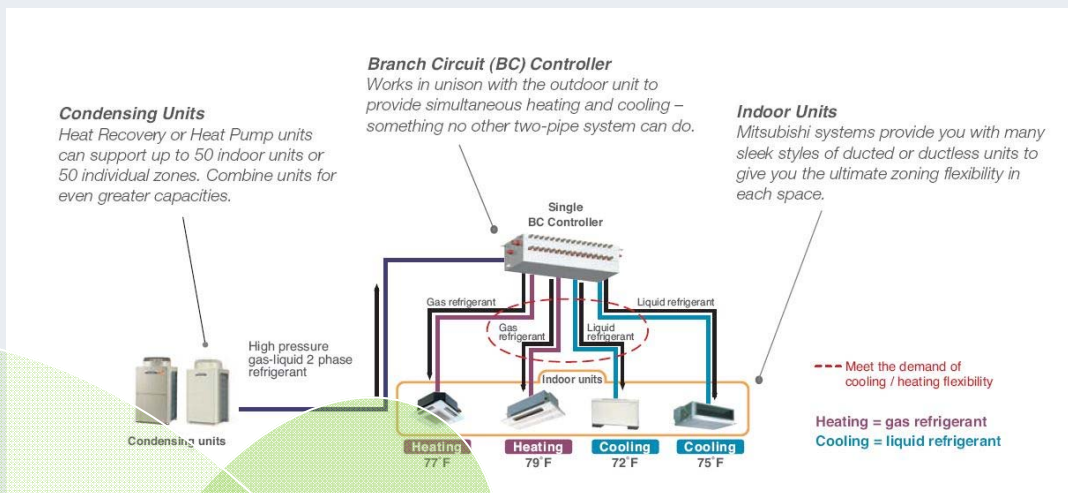
Specific Architectural Issues

There are a number of architectural considerations for VRF systems which should be discussed with your engineer.
Pros:

1. Provides independent temperature control in each room, making for happy clients.
2. Requires a minimal amount of ceiling space which may allow higher ceilings.
3. Allows future flexibility for a more sustainable facility.
4. Ultra- high system efficiencies which will improve Title 24 compliance scores and add LEED points.

Cons:

1. May be more expensive than more traditional systems by approximately 20%, depending on building configuration and complexity.
2. May cause some noise issues which should be reviewed with your engineer for specific areas of concern.
3. Aesthetics may not meet the interior design goals of the project, depending on equipment selections.
4. Requires a separate outside air system, in most cases, which may add costs to the project.



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